#6

SEQUENCE LISTING

<110> BOZONET, Sophie Anne Michele et al.

<120> NUCLEIC ACID MOLECULES CODING FOR A DEXTRANSACCHARASE CATALYSING THE SYNTHESIS OF DEXTRAN WITH ALPHA 1,2 OSIDIC SIDECHAINS

<130> 2121-0183PUS1

<140> US 10/509,024
<141> 2004-09-27

<150> PCT/FR02/00951
<151> 2002-03-18

<150> 0103631
<151> 2001-03-16

<150> 0116495
<151> 2001-12-19

<160> 103

<170> PatentIn version 3.3

<210> 1
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<212> PRT
<213> Leuconostoc mesenteroides

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<223> catalytic domain

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Asp Met Ser Thr Asn Ala Phe Ser Thr Lys Asn Val Ala Phe Asn His
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Asp Ser Ser Ser Phe Asp His Thr Val Asp Gly Phe Leu Thr Ala Asp
             20                  25                  30

Thr Trp Tyr Arg Pro Lys Ser Ile Leu Ala Asn Gly Thr Thr Trp Arg
         35                  40                  45

Asp Ser Thr Asp Lys Asp Met Arg Pro Leu Ile Thr Val Trp Trp Pro
     50                  55                  60

Asn Lys Asn Val Gln Val Asn Tyr Leu Asn Phe Met Lys Ala Asn Gly
 65                  70                  75                  80

Leu Leu Thr Thr Ala Ala Gln Tyr Thr Leu His Ser Asp Gln Tyr Asp
                 85                  90                  95

Leu Asn Gln Ala Ala Gln Asp Val Gln Val Ala Ile Glu Arg Arg Ile
            100                 105                 110

Ala Ser Glu His Gly Thr Asp Trp Leu Gln Lys Leu Leu Phe Glu Ser
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        115                 120                 125

Gln Asn Asn Asn Pro Ser Phe Val Lys Gln Gln Phe Ile Trp Asn Lys
    130                 135                 140

Asp Ser Glu Tyr His Gly Gly Gly Asp Ala Trp Phe Gln Gly Gly Tyr
145                 150                 155                 160

Leu Lys Tyr Gly Asn Asn Pro Leu Thr Pro Thr Thr Asn Ser Asp Tyr
                165                 170                 175

Arg Gln Pro Gly Asn Ala Phe Asp Phe Leu Leu Ala Asn Asp Val Asp
            180                 185                 190

Asn Ser Asn Pro Val Val Gln Ala Glu Asn Leu Asn Trp Leu His Tyr
        195                 200                 205

Leu Met Asn Phe Gly Thr Ile Thr Ala Gly Gln Asp Asp Ala Asn Phe
    210                 215                 220

Asp Ser Ile Arg Ile Asp Ala Val Asp Phe Ile His Asn Asp Thr Ile
225                 230                 235                 240

Gln Arg Thr Tyr Asp Tyr Leu Arg Asp Ala Tyr Gln Val Gln Gln Ser
                245                 250                 255

Glu Ala Lys Ala Asn Gln His Ile Ser Leu Val Glu Ala Gly Leu Asp
            260                 265                 270

Ala Gly Thr Ser Thr Ile His Asn Asp Ala Leu Ile Glu Ser Asn Leu
        275                 280                 285

Arg Glu Ala Ala Thr Leu Ser Leu Thr Asn Glu Pro Gly Lys Asn Lys
    290                 295                 300

Pro Leu Thr Asn Met Leu Gln Asp Val Asp Gly Gly Thr Leu Ile Thr
305                 310                 315                 320

Asp His Thr Gln Asn Ser Thr Glu Asn Gln Ala Thr Pro Asn Tyr Ser
                325                 330                 335

Ile Ile His Ala His Asp Lys Gly Val Gln Glu Lys Val Gly Ala Ala
            340                 345                 350

Ile Thr Asp Ala Thr Gly Ala Asp Trp Thr Asn Phe Thr Asp Glu Gln
        355                 360                 365

Leu Lys Ala Gly Leu Glu Leu Phe Tyr Lys Asp Gln Arg Ala Thr Asn
    370                 375                 380

Lys Lys Tyr Asn Ser Tyr Asn Ile Pro Ser Ile Tyr Ala Leu Met Leu
385                 390                 395                 400

Thr Asn Lys Asp Thr Val Pro Arg Met Tyr Tyr Gly Asp Met Tyr Gln
                405                 410                 415

Asp Asp Gly Gln Tyr Met Ala Asn Lys Ser Ile Tyr Tyr Asp Ala Leu
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            420                 425                 430

Val Ser Leu Met Thr Ala Arg Lys Ser Tyr Val Ser Gly Gly Gln Thr
        435                 440                 445


Met Ser Val Asp Asn His Gly Leu Leu Lys Ser Val Arg Phe Gly Lys
    450                 455                 460

Asp Ala Met Thr Ala Asn Asp Leu Gly Thr Ser Ala Thr Arg Thr Glu
465                 470                 475                 480

Gly Leu Gly Val Ile Ile Gly Asn Asp Pro Lys Leu Gln Leu Asn Asp
                485                 490                 495

Ser Asp Lys Val Thr Leu Asp Met Gly Ala Ala His Lys Asn Gln Lys
            500                 505                 510

Tyr Arg Ala Val Ile Leu Thr Thr Arg Asp Gly Leu Ala Thr Phe Asn
        515                 520                 525

Ser Asp Gln Ala Pro Thr Ala Trp Thr Asn Asp Gln Gly Thr Leu Thr
    530                 535                 540

Phe Ser Asn Gln Glu Ile Asn Gly Gln Asp Asn Thr Gln Ile Arg Gly
545                 550                 555                 560

Val Ala Asn Pro Gln Val Ser Gly Tyr Leu Ala Val Trp Val Pro Val
                565                 570                 575

Gly Ala Ser Asp Asn Gln Asp Ala Arg Thr Ala Ala Thr Thr Thr Glu
            580                 585                 590

Asn His Asp Gly Lys Val Leu His Ser Asn Ala Ala Leu Asp Ser Asn
        595                 600                 605

Leu Ile Tyr Glu Gly Phe Ser Asn Phe Gln Pro Lys Ala Thr Thr His
    610                 615                 620

Asp Glu Leu Thr Asn Val Val Ile Ala Lys Asn Ala Asp Val Phe Asn
625                 630                 635                 640

Asn Trp Gly Ile Thr Ser Phe Glu Met Ala Pro Gln Tyr Arg Ser Ser
                645                 650                 655

Gly Asp His Thr Phe Leu Asp Ser Thr Ile Asp Asn Gly Tyr Ala Phe
            660                 665                 670

Thr Asp Arg Tyr Asp Leu Gly Phe Asn Thr Pro Thr Lys Tyr Gly Thr
        675                 680                 685

Asp Gly Asp Leu Arg Ala Thr Ile Gln Ala Leu His His Ala Asn Met
    690                 695                 700

Gln Val Met Ala Asp Val Val Asp Asn Gln Val Tyr Asn Leu Pro Gly
705                 710                 715                 720
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Lys Glu Val Val Ser Ala Thr Arg Ala Gly Val Tyr Gly Asn Asp Asp
                725                 730                 735

Ala Thr Gly Phe Gly Thr Gln Leu Tyr Val Thr Asn Ser Val Gly Gly
            740                 745                 750

Gly Gln Tyr Gln Glu Lys Tyr Ala Gly Gln Tyr Leu Glu Ala Leu Lys
        755                 760                 765


Ala Lys Tyr Pro Asp Leu Phe Glu Gly Lys Ala Tyr Asp Tyr Trp Tyr
    770                 775                 780

Lys Asn Tyr Ala Asn Asp Gly Ser Asn Pro Tyr Tyr Thr Leu Ser His
785                 790                 795                 800

Gly Asp Arg Glu Ser Ile Pro Ala Asp Val Ala Ile Lys Gln Trp Ser
                805                 810                 815

Ala Lys Tyr Met Asn Gly Thr Asn Val Leu Gly Asn Gly Met Gly Tyr
            820                 825                 830

Val Leu Lys Asp Trp His Asn Gly Gln Tyr Phe Lys Leu Asp Gly Asp
        835                 840                 845

Lys Ser Thr Leu Pro Gln Ile
    850                 855


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<212> PRT
<213> Leuconostoc mesenteroides

<220>
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Gly Lys Val Leu Val Thr Ala Gly Ile Phe Ala Leu Met Met Phe Gly
             20                  25                  30

Val Thr Thr Ala Ser Val Ser Ala Asn Thr Ile Ala Val Asp Thr Asn
         35                  40                  45

His Ser Arg Thr Ser Ala Gln Ile Asn Lys Ser Ala Val Asp Lys Val
     50                  55                  60

Asn Asp Asp Lys Thr Thr Leu Gly Ala Ala Lys Val Val Ala Val Ala
 65                  70                  75                  80

Thr Thr Pro Ala Thr Pro Val Ala Asp Lys Thr Val Ser Ala Pro Ala
                 85                  90                  95

Ala Asp Lys Ala Val Asp Thr Thr Ser Ser Thr Thr Pro Ala Thr Asp
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```
            100                 105                 110

Lys Ala Val Asp Thr Thr Pro Thr Thr Pro Ala Ala Asp Lys Ala Val
        115                 120                 125
Asp Thr Thr Pro Thr Thr Pro Ala Ala Asp Lys Ala Val Asp Thr Thr
    130                 135                 140

Pro Thr Thr Pro Ala Ala Asn Lys Ala Val Asp Thr Thr Pro Ala Thr
145                 150                 155                 160

Ala Ala Thr Asp Lys Ala Val Ala Thr Pro Ala Thr Pro Ala Ala Asp
                165                 170                 175

Lys Leu Ala Asn Thr Thr Pro Ala Thr Asp Lys Ala Val Ala Thr Thr
            180                 185                 190

Pro Ala Thr Pro Val Ala Asn Lys Ala Ala Asp Thr Ser Ser Ile His
        195                 200                 205

Asp Gln Pro Leu Asp Thr Asn Val Pro Thr Asp Lys Ser Ala Asn Leu
    210                 215                 220

Val Ser Thr Thr Gln Lys Ser Thr Asp Asn Gln Gln Val Lys Ser Thr
225                 230                 235                 240

Glu Thr Ser His Leu Gln Glu Ile Asn Gly Lys Thr Tyr Phe Leu Asp
                245                 250                 255

Asp Asn Gly Gln Val Lys Lys Asn Phe Thr Ala Ile Ile Asp Gly Lys
            260                 265                 270

Val Leu Tyr Phe Asp Lys Thr Ser Gly Glu Leu Thr Ala Asn Ala Pro
        275                 280                 285

Gln Val Thr Lys Gly Leu Val Asn Ile Asp Asn Ala His Asn Ala Ala
    290                 295                 300

His Asp Leu Thr Ala Asp Asn Phe Thr Asn Val Asp Gly Tyr Leu Thr
305                 310                 315                 320

Ala Asn Ser Trp Tyr Arg Pro Lys Asp Ile Leu Lys Asn Gly Thr Thr
                325                 330                 335

Trp Thr Pro Thr Thr Ala Glu Asp Phe Arg Pro Leu Leu Met Ser Trp
            340                 345                 350

Trp Pro Asp Lys Asn Thr Gln Val Ala Tyr Leu Gln Tyr Met Gln Ser
        355                 360                 365

Val Gly Met Leu Pro Asp Asp Val Lys Val Ser Asn Asp Asp Asn Met
    370                 375                 380

Ser Thr Leu Thr Asp Ala Ala Met Thr Val Gln Lys Asn Ile Glu Ser
385                 390                 395                 400

Arg Ile Gly Val Ser Gly Lys Thr Asp Trp Leu Lys Gln Asp Met Asn
                405                 410                 415
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```
Lys Leu Ile Asp Ser Gln Ala Asn Trp Asn Ile Asp Ser Glu Ser Lys
            420                 425                 430

Gly Asn Asp His Leu Gln Gly Gly Ala Leu Leu Tyr Val Asn Asp Asp
        435                 440                 445

Lys Thr Pro Asn Ala Asn Ser Asp Tyr Arg Leu Leu Asn Arg Thr Pro
    450                 455                 460

Thr Asn Gln Thr Gly Gln Ile Thr Asp Pro Ser Lys Gln Gly Gly Tyr
465                 470                 475                 480

Glu Met Leu Leu Ala Asn Asp Val Asp Asn Ser Asn Pro Val Val Gln
                485                 490                 495


Ala Glu Gln Leu Asn Trp Leu His Tyr Met Met Asn Ile Gly Thr Ile
            500                 505                 510

Ala Gln Asn Asp Pro Thr Ala Asn Phe Asp Gly Tyr Arg Val Asp Ala
        515                 520                 525

Val Asp Asn Val Asp Ala Asp Leu Leu Gln Ile Ala Gly Asp Tyr Phe
    530                 535                 540

Lys Ala Ala Tyr Gly Thr Gly Lys Thr Glu Ala Asn Ala Asn Asn His
545                 550                 555                 560

Ile Ser Ile Leu Glu Asp Trp Asp Asn Asn Asp Ser Ala Tyr Ile Lys
                565                 570                 575

Ala His Gly Asn Asn Gln Leu Thr Met Asp Phe Pro Ala His Leu Ala
            580                 585                 590

Leu Lys Tyr Ala Leu Asn Met Pro Leu Ala Ala Gln Ser Gly Leu Glu
        595                 600                 605

Pro Leu Ile Asn Thr Ser Leu Val Lys Arg Gly Lys Asp Ala Thr Glu
    610                 615                 620

Asn Glu Ala Gln Pro Asn Tyr Ala Phe Ile Arg Ala His Asp Ser Glu
625                 630                 635                 640

Val Gln Thr Val Ile Ala Gln Ile Ile Lys Asp Lys Ile Asn Thr Lys
                645                 650                 655

Ser Asp Gly Leu Thr Val Thr Pro Asp Glu Ile Lys Gln Ala Phe Thr
            660                 665                 670

Ile Tyr Asn Ala Asp Glu Leu Lys Ala Asp Lys Glu Tyr Thr Ala Tyr
        675                 680                 685

Asn Ile Pro Ala Ser Tyr Ala Val Leu Leu Thr Asn Lys Asp Thr Val
    690                 695                 700

Pro Arg Val Tyr Tyr Gly Asp Leu Phe Ser Asp Asp Gly Gln Tyr Met
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705 710 715 720

Ser Gln Lys Ser Pro Tyr Tyr Asp Ala Ile Thr Ser Leu Leu Lys Ser
725 730 735

Arg Ile Lys Tyr Val Ala Gly Gly Gln Ser Met Asn Met Thr Tyr Leu
740 745 750

His Glu Cys Phe Asp Pro Ala Lys Asn Glu Thr Lys Pro Gln Gly Val
755 760 765

Leu Thr Ser Val Arg Tyr Gly Lys Gly Ala Met Thr Ala Asp Asp Leu
770 775 780

Gly Asn Ser Asp Thr Arg Gln Gln Gly Ile Gly Leu Val Ile Asn Asn
785 790 795 800

Lys Pro Phe Leu Asn Leu Asn Asp Asp Glu Gln Ile Val Leu Asn Met
805 810 815

Gly Ala Ala His Lys Asn Gln Ala Tyr Arg Pro Leu Met Leu Thr Thr
820 825 830

Lys Ser Gly Leu Gln Ile Tyr Asp Lys Asp Ala Gly Ala Pro Val Val
835 840 845

Tyr Thr Asn Asp Ala Gly Gln Leu Ile Phe Lys Ser Asp Met Val Tyr
850 855 860

Gly Val Ser Asn Pro Gln Val Ser Gly Tyr Phe Ala Ala Trp Val Pro
865 870 875 880

Val Gly Ala Ser Asp Ser Gln Asp Ala Arg Thr Gln Ser Ser Gln Ser
885 890 895

Glu Thr Lys Asp Gly Asp Val Tyr His Ser Asn Ala Ala Leu Asp Ser
900 905 910

Asn Val Ile Tyr Glu Gly Phe Ser Asn Phe Gln Ala Met Pro Glu Lys
915 920 925

Asn Asp Asp Phe Thr Asn Val Lys Ile Ala Gln Asn Ala Lys Leu Phe
930 935 940

Lys Asp Leu Gly Ile Thr Ser Phe Glu Leu Ala Pro Gln Tyr Arg Ser
945 950 955 960

Ser Thr Asp Asn Ser Phe Leu Asp Ser Val Ile Gln Asn Gly Tyr Ala
965 970 975

Phe Thr Asp Arg Tyr Asp Val Gly Tyr Asn Thr Pro Thr Lys Tyr Gly
980 985 990

Thr Val Asp Gln Leu Leu Asp Ser Leu Arg Ala Leu His Ala Gln Gly
995 1000 1005

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Ile Gln Ala Ile Asn Asp Trp Val Pro Asp Gln Ile Tyr Asn Leu Pro
   1010                1015                1020

Gly Glu Gln Ile Val Thr Ala Val Arg Thr Asn Gly Ser Gly Lys Tyr
1025                1030                1035                1040

Asp Tyr Asp Ser Val Ile Asn Asn Thr Leu Tyr Asp Ser Arg Thr Val
                1045                1050                1055

Gly Gly Gly Glu Tyr Gln Glu Lys Phe Gly Gly Leu Phe Leu Asp Gln
            1060                1065                1070

Leu Lys Lys Asp Tyr Pro Ser Leu Phe Glu Thr Lys Gln Ile Ser Thr
        1075                1080                1085

Asn Gln Pro Met Asn Pro Asp Val Lys Ile Lys Glu Trp Ser Ala Lys
   1090                1095                1100

Tyr Phe Asn Gly Ser Asn Ile Gln Gly Arg Gly Ala Trp Tyr Val Leu
1105                1110                1115                1120

Lys Asp Trp Ala Thr Asn Gln Tyr Phe Asn Val Ser Ser Asp Asn Gly
                1125                1130                1135


Phe Leu Pro Lys Gln Leu Leu Gly Glu Lys Thr Ser Thr Gly Phe Ile
            1140                1145                1150

Thr Glu Asn Gly Lys Thr Ser Phe Tyr Ser Thr Ser Gly Tyr Gln Ala
        1155                1160                1165

Lys Asp Thr Phe Ile Gln Asp Gly Thr Asn Trp Tyr Tyr Phe Asp Asn
   1170                1175                1180

Ala Gly Tyr Met Leu Thr Gly Lys Gln Asn Ile His Asp Lys Asn Tyr
1185                1190                1195                1200

Tyr Phe Leu Pro Asn Gly Val Glu Leu Gln Asp Ala Tyr Leu Phe Asp
                1205                1210                1215

Gly Asn Gln Glu Phe Tyr Tyr Asn Lys Ala Gly Glu Gln Val Met Asn
            1220                1225                1230

Gln Tyr Tyr Gln Asp Ser Gln Asn Gln Trp His Tyr Phe Phe Glu Asn
        1235                1240                1245

Gly Arg Met Ala Ile Gly Leu Thr Glu Val Pro Asn Ala Asp Gly Thr
   1250                1255                1260

His Val Thr Gln Tyr Phe Asp Ala Asn Gly Val Gln Ile Lys Gly Thr
1265                1270                1275                1280

Ala Ile Lys Asp Gln Asn Asn Gln Leu Arg Tyr Phe Asp Glu Ala Thr
                1285                1290                1295

Gly Asn Met Val Val Asn Ser Trp Gly Gln Leu Ala Asp Lys Ser Trp
            1300                1305                1310
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Leu Tyr Leu Asn Ala Gln Gly Val Ala Val Thr Gly Asn Gln Lys Ile
       1315                1320                1325

Asp Gly Glu Glu Tyr Tyr Phe Asn Ala Asp Gly Lys Gln Val Lys Gly
   1330                1335                1340

Asn Ala Ile Ile Asp Asn Asn Gly Asp Gln Arg Tyr Tyr Asp Gly Asp
1345                1350                1355                1360

Lys Gly Val Met Val Val Asn Ser Trp Gly Glu Leu Pro Asp Gly Ser
               1365                1370                1375

Trp Leu Tyr Leu Asn Asp Lys Gly Ile Ala Val Thr Gly Arg Gln Val
           1380                1385                1390

Ile Asn Asn Gln Val Asn Phe Phe Gly Asn Asp Gly Lys Gln Ile Lys
       1395                1400                1405

Asp Ala Phe Lys Leu Leu Ser Asp Gly Ser Trp Val Tyr Leu Asp Asp
   1410                1415                1420

Lys Gly Leu Ile Thr Thr Gly Ala Lys Val Ile Asn Gly Leu Asn Met
1425                1430                1435                1440

Phe Phe Asp Lys Asp Gly His Gln Ile Lys Gly Asp Ala Ser Thr Asp
               1445                1450                1455


Ala Asn Gly Lys Arg His Tyr Tyr Asp Lys Asn Asp Gly His Leu Val
           1460                1465                1470

Thr Asn Ser Trp Gly Glu Leu Pro Asp Gly Ser Trp Leu Tyr Leu Glu
       1475                1480                1485

Glu Gln Gly Asp Ala Val Thr Gly Gln Arg Val Ile Asp Gly Lys Thr
   1490                1495                1500
Arg Tyr Phe Asp Glu Asp Gly Lys Gln Ile Lys Asn Ser Leu Lys Thr
1505                1510                1515                1520

Leu Ala Asn Gly Asp Lys Ile Tyr Leu Asp Gly Asp Gly Val Ala Ala
               1525                1530                1535

Thr Gly Leu Gln His Val Gly Asp Lys Ile Met Tyr Phe Asp Glu Asp
           1540                1545                1550

Gly Lys Gln Val Val Gly Lys Phe Val Ser Ala Lys Asp Gly Ser Trp
       1555                1560                1565

Tyr Tyr Leu Asn Gln Asp Gly Val Ala Ala Val Gly Pro Ser Ser Ile
   1570                1575                1580

Asn Gly Gln Ser Leu Tyr Phe Asp Gln Asp Gly Lys Gln Val Lys Tyr
1585                1590                1595                1600

Asn Glu Val Arg Asn Ser Asp Gly Thr Thr Asn Tyr Tyr Thr Gly Leu
               1605                1610                1615
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```
Thr Gly Glu Lys Leu Thr Gln Asp Phe Gly Glu Leu Pro Asp Gly Ser
      1620                1625                1630

Trp Ile Tyr Leu Asp Ala Gln Gly His Thr Val Thr Gly Ala Gln Ile
       1635                1640                1645

Ile Asn Gly Gln Asn Leu Tyr Phe Lys Ala Asp Gly Gln Gln Val Lys
   1650                1655                1660

Gly His Ala Tyr Thr Asp Gln Leu Gly His Met Arg Phe Tyr Asp Pro
1665                1670                1675                1680

Asp Ser Gly Asp Met Leu Ser Asn Arg Phe Glu Gln Ile Thr Pro Gly
               1685                1690                1695

Val Trp Ala Tyr Phe Gly Ala Asp Gly Val Ala Ile Thr Gly Gln His
           1700                1705                1710

Asp Ile Asn Gly Gln Lys Leu Phe Phe Asp Glu Thr Gly Tyr Gln Val
       1715                1720                1725

Lys Gly Ser Gln Arg Thr Ile Asp Gly Thr Leu Tyr Ser Phe Asp Ser
   1730                1735                1740

Gln Thr Gly Asn Gln Lys Arg Val Gln Thr Thr Leu Leu Pro Gln Ala
1745                1750                1755                1760

Gly His Tyr Ile Thr Lys Asn Gly Asn Asp Trp Gln Tyr Asp Thr Asn
               1765                1770                1775


Gly Glu Leu Ala Lys Gly Leu Arg Gln Asp Ser Asn Gly Lys Leu Arg
           1780                1785                1790

Tyr Phe Asp Leu Thr Thr Gly Ile Gln Ala Lys Gly Gln Phe Val Thr
       1795                1800                1805

Ile Gly Gln Glu Thr Tyr Tyr Phe Ser Lys Asp His Gly Asp Ala Gln
   1810                1815                1820

Leu Leu Pro Met Val Thr Glu Gly His Tyr Gly Thr Ile Thr Leu Lys
1825                1830                1835                1840

Gln Gly Gln Asp Thr Lys Thr Ala Trp Val Tyr Arg Asp Gln Asn Asn
               1845                1850                1855

Thr Ile Leu Lys Gly Leu Gln Asn Ile Asn Gly Thr Leu Gln Phe Phe
           1860                1865                1870

Asp Pro Tyr Thr Gly Glu Gln Leu Lys Gly Gly Val Ala Lys Tyr Asp
       1875                1880                1885

Asp Lys Leu Phe Tyr Phe Glu Ser Gly Lys Gly Asn Leu Val Ser Thr
   1890                1895                1900

Val Ala Gly Asp Tyr Gln Asp Gly His Tyr Ile Ser Gln Asp Gly Gln
```

1905 1910 1915 1920

Thr Arg Tyr Ala Asp Lys Gln Asn Gln Leu Val Lys Gly Leu Val Thr
1925 1930 1935

Val Asn Gly Ala Leu Gln Tyr Phe Asp Asn Ala Thr Gly Asn Gln Ile
1940 1945 1950

Lys Asn Gln Gln Val Ile Val Asp Gly Lys Thr Tyr Tyr Phe Asp Asp
1955 1960 1965

Lys Gly Asn Gly Glu Tyr Leu Phe Thr Asn Thr Leu Asp Met Ser Thr
1970 1975 1980

Asn Ala Phe Ser Thr Lys Asn Val Ala Phe Asn His Asp Ser Ser Ser
1985 1990 1995 2000

Phe Asp His Thr Val Asp Gly Phe Leu Thr Ala Asp Thr Trp Tyr Arg
2005 2010 2015

Pro Lys Ser Ile Leu Ala Asn Gly Thr Thr Trp Arg Asp Ser Thr Asp
2020 2025 2030

Lys Asp Met Arg Pro Leu Ile Thr Val Trp Trp Pro Asn Lys Asn Val
2035 2040 2045

Gln Val Asn Tyr Leu Asn Phe Met Lys Ala Asn Gly Leu Leu Thr Thr
2050 2055 2060

Ala Ala Gln Tyr Thr Leu His Ser Asp Gln Tyr Asp Leu Asn Gln Ala
2065 2070 2075 2080

Ala Gln Asp Val Gln Val Ala Ile Glu Arg Arg Ile Ala Ser Glu His
2085 2090 2095

Gly Thr Asp Trp Leu Gln Lys Leu Leu Phe Glu Ser Gln Asn Asn Asn
2100 2105 2110

Pro Ser Phe Val Lys Gln Gln Phe Ile Trp Asn Lys Asp Ser Glu Tyr
2115 2120 2125

His Gly Gly Gly Asp Ala Trp Phe Gln Gly Gly Tyr Leu Lys Tyr Gly
2130 2135 2140

Asn Asn Pro Leu Thr Pro Thr Thr Asn Ser Asp Tyr Arg Gln Pro Gly
2145 2150 2155 2160

Asn Ala Phe Asp Phe Leu Leu Ala Asn Asp Val Asp Asn Ser Asn Pro
2165 2170 2175

Val Val Gln Ala Glu Asn Leu Asn Trp Leu His Tyr Leu Met Asn Phe
2180 2185 2190

Gly Thr Ile Thr Ala Gly Gln Asp Asp Ala Asn Phe Asp Ser Ile Arg
2195 2200 2205

Ile Asp Ala Val Asp Phe Ile His Asn Asp Thr Ile Gln Arg Thr Tyr
2210 2215 2220

Asp Tyr Leu Arg Asp Ala Tyr Gln Val Gln Gln Ser Glu Ala Lys Ala
2225 2230 2235 2240

Asn Gln His Ile Ser Leu Val Glu Ala Gly Leu Asp Ala Gly Thr Ser
2245 2250 2255

Thr Ile His Asn Asp Ala Leu Ile Glu Ser Asn Leu Arg Glu Ala Ala
2260 2265 2270

Thr Leu Ser Leu Thr Asn Glu Pro Gly Lys Asn Lys Pro Leu Thr Asn
2275 2280 2285

Met Leu Gln Asp Val Asp Gly Gly Thr Leu Ile Thr Asp His Thr Gln
2290 2295 2300

Asn Ser Thr Glu Asn Gln Ala Thr Pro Asn Tyr Ser Ile Ile His Ala
2305 2310 2315 2320

His Asp Lys Gly Val Gln Glu Lys Val Gly Ala Ala Ile Thr Asp Ala
2325 2330 2335

Thr Gly Ala Asp Trp Thr Asn Phe Thr Asp Glu Gln Leu Lys Ala Gly
2340 2345 2350

Leu Glu Leu Phe Tyr Lys Asp Gln Arg Ala Thr Asn Lys Lys Tyr Asn
2355 2360 2365

Ser Tyr Asn Ile Pro Ser Ile Tyr Ala Leu Met Leu Thr Asn Lys Asp
2370 2375 2380

Thr Val Pro Arg Met Tyr Tyr Gly Asp Met Tyr Gln Asp Asp Gly Gln
2385 2390 2395 2400

Tyr Met Ala Asn Lys Ser Ile Tyr Tyr Asp Ala Leu Val Ser Leu Met
2405 2410 2415

Thr Ala Arg Lys Ser Tyr Val Ser Gly Gly Gln Thr Met Ser Val Asp
2420 2425 2430

Asn His Gly Leu Leu Lys Ser Val Arg Phe Gly Lys Asp Ala Met Thr
2435 2440 2445

Ala Asn Asp Leu Gly Thr Ser Ala Thr Arg Thr Glu Gly Leu Gly Val
2450 2455 2460

Ile Ile Gly Asn Asp Pro Lys Leu Gln Leu Asn Asp Ser Asp Lys Val
2465 2470 2475 2480

Thr Leu Asp Met Gly Ala Ala His Lys Asn Gln Lys Tyr Arg Ala Val
2485 2490 2495

Ile Leu Thr Thr Arg Asp Gly Leu Ala Thr Phe Asn Ser Asp Gln Ala
2500 2505 2510

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Pro Thr Ala Trp Thr Asn Asp Gln Gly Thr Leu Thr Phe Ser Asn Gln
       2515                2520                2525

Glu Ile Asn Gly Gln Asp Asn Thr Gln Ile Arg Gly Val Ala Asn Pro
   2530                2535                2540

Gln Val Ser Gly Tyr Leu Ala Val Trp Val Pro Val Gly Ala Ser Asp
2545                2550                2555                2560

Asn Gln Asp Ala Arg Thr Ala Ala Thr Thr Thr Glu Asn His Asp Gly
               2565                2570                2575

Lys Val Leu His Ser Asn Ala Ala Leu Asp Ser Asn Leu Ile Tyr Glu
           2580                2585                2590

Gly Phe Ser Asn Phe Gln Pro Lys Ala Thr Thr His Asp Glu Leu Thr
       2595                2600                2605

Asn Val Val Ile Ala Lys Asn Ala Asp Val Phe Asn Asn Trp Gly Ile
   2610                2615                2620

Thr Ser Phe Glu Met Ala Pro Gln Tyr Arg Ser Ser Gly Asp His Thr
2625                2630                2635                2640

Phe Leu Asp Ser Thr Ile Asp Asn Gly Tyr Ala Phe Thr Asp Arg Tyr
               2645                2650                2655

Asp Leu Gly Phe Asn Thr Pro Thr Lys Tyr Gly Thr Asp Gly Asp Leu
           2660                2665                2670

Arg Ala Thr Ile Gln Ala Leu His His Ala Asn Met Gln Val Met Ala
       2675                2680                2685

Asp Val Val Asp Asn Gln Val Tyr Asn Leu Pro Gly Lys Glu Val Val
   2690                2695                2700

Ser Ala Thr Arg Ala Gly Val Tyr Gly Asn Asp Asp Ala Thr Gly Phe
2705                2710                2715                2720

Gly Thr Gln Leu Tyr Val Thr Asn Ser Val Gly Gly Gly Gln Tyr Gln
               2725                2730                2735


Glu Lys Tyr Ala Gly Gln Tyr Leu Glu Ala Leu Lys Ala Lys Tyr Pro
           2740                2745                2750

Asp Leu Phe Glu Gly Lys Ala Tyr Asp Tyr Trp Tyr Lys Asn Tyr Ala
       2755                2760                2765

Asn Asp Gly Ser Asn Pro Tyr Tyr Thr Leu Ser His Gly Asp Arg Glu
   2770                2775                2780

Ser Ile Pro Ala Asp Val Ala Ile Lys Gln Trp Ser Ala Lys Tyr Met
2785                2790                2795                2800

Asn Gly Thr Asn Val Leu Gly Asn Gly Met Gly Tyr Val Leu Lys Asp
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2805 2810 2815

Trp His Asn Gly Gln Tyr Phe Lys Leu Asp Gly Asp Lys Ser Thr Leu
2820 2825 2830

Pro Gln Ile
2835

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ttggctaacg ggacaacttg gcgtgattcg actgataagg atatgcgacc attaatcact 180
gtttggtggc caaataagaa tgttcaagtc aactacctca acttcatgaa agcaaatggc 240
ttgttgacaa cagcagcaca atacacacta cattcagatc aatatgattt gaaccaagct 300
gcacaagatg ttcaagtggc cattgaaagg cgcattgcgt cagagcatgg cacagactgg 360
ttacagaaat tgttgtttga atcacaaaat aataacccat catttgtgaa gcaacaattc 420
atttggaaca aggattctga atatcatggt ggtggtgatg cttggttcca aggtggttat 480
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Val Val Gln Ala Glu Gln Leu Asn

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<210> 12
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Val Val Gln Ala Glu Asn Leu Asn
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<400> 14

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<400> 16

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<400> 18

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<210> 36
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Lys Gly Val Gln Glu Lys Val
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<210> 37
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Asn Val Asp Ala Asp Leu Leu
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<210> 38
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<400> 38

Ser Glu Val Gln Thr Val Ile
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<400> 39

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<400> 40

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1 5 10 15

Gln Ala Asn Pro Lys Gly Gln Thr Phe Lys Asp Gly Ser Gly Val Leu
20 25 30

Arg Phe Tyr Asn Leu Glu Gly Gln Tyr Val Ser Gly Ser Gly Trp Tyr
35 40 45

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<400> 41

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1 5 10 15

Asn Arg Phe Val
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<210> 42
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<400> 42

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Tyr Tyr Phe Xaa Ala Xaa Gln Gly Xaa Xaa Xaa Leu
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<210> 44
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<212> PRT
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<400> 44

Tyr Tyr Phe Asp Asp Lys Gly Asn Gly Glu Tyr Cys Phe Thr Asn Thr
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<210> 45
<211> 38
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<400> 45

Met Phe Met Ile Lys Glu Arg Asn Val Arg Lys Lys Leu Tyr Lys Ser
1 5 10 15

Gly Lys Ser Trp Val Ile Gly Gly Leu Ile Leu Ser Thr Ile Met Leu
20 25 30

Ser Met Thr Ala Thr Ser
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<210> 46
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<400> 46

Met Pro Phe Thr Glu Lys Val Met Arg Lys Lys Leu Tyr Lys Val Gly
1 5 10 15

Lys Ser Trp Val Val Gly Gly Val Cys Ala Phe Ala Leu Thr Ala Ser
20 25 30

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<213> Leuconostoc mesenteroides

<400> 47

Met Lys Gln Gln Glu Thr Val Thr Arg Lys Lys Tyr Lys Ser Gly Lys
1 5 10 15

Val Trp Val Ala Ala Ala Thr Ala Phe Ala Val Leu Gly Val Ser Thr
20 25 30

Val Thr Thr Val His Ala
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<210> 48
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<212> DNA
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<220>
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<212> DNA
<213> Artificial Sequence

<220>
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<400> 49
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<400> 50

Ala Ala Lys Val Val Ala Val Ala Thr Thr Pro Ala Thr
1 5 10

<210> 51
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<400> 51

Pro Val Ala Asp Lys Thr Val Ser Ala
1 5

<210> 52
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<400> 52

Pro Ala Ala Asp Lys Ala Val Asp Thr Thr Ser Ser Thr Thr
1 5 10

<210> 53
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<400> 53

Pro Ala Thr Asp Lys Ala Val Asp Thr Thr Pro Thr Thr
1 5 10

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1 5 10

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1 5 10

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<400> 56

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1 5 10

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<400> 57

Ala Ala Thr Asp Lys Ala Val Ala Thr Pro Ala Thr
1 5 10

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<400> 58

Pro Ala Ala Asp Lys Leu Ala Asn Thr Thr Ala Thr
1 5 10

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<400> 59

Asp Lys Ala Val Ala Thr Thr Pro Ala Thr
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Pro Val Ala Asn Lys Ala Ala
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<400> 62

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Asn

<210> 63
<211> 24
<212> PRT
<213> Leuconostoc mesenteroides

<400> 63

Gly Gly Tyr Glu Phe Leu Leu Ala Asn Asp Val Asp Asn Ser Asn Pro

1 5 10 15

Val Val Gln Ala Glu Gln Leu Asn
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<210> 64
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<213> Leuconostoc mesenteroides

<400> 64

Ala Asn Phe Asp Ser Ile Arg Val Asp Ala Val Asp Asn Val Asp Ala
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Asp Leu Leu Gln Ile
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<210> 65
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<212> PRT
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<400> 65

His Leu Ser Ile Leu Glu Ala Trp Ser Asp Asn Asp
1 5 10

<210> 66
<211> 15
<212> PRT
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<400> 66

Tyr Ser Phe Ile Arg Ala His Asp Ser Glu Val Gln Asp Leu Ile
1 5 10 15

<210> 67
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<400> 67

Asp Trp Val Pro Asp Gln Met Tyr
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<210> 68
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<212> PRT
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Asn

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Ile Val Gln Ala Glu Gln Leu Asn
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Val Val Gln Ala Glu Gln Leu Asn
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Asn

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Val Val Gln Ala Glu Gln Leu Asn
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<210> 82
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<400> 82

Ala Asn Phe Asp Gly Ile Arg Val Asp Ala Val Asp Asn Val Asp Ala
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Asp Leu Leu Gln Ile
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His Leu Ser Ile Leu Glu Asp Trp Ser His Asn Asp
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Tyr Ser Phe Val Arg Ala His Asp Ser Glu Val Gln Thr Val Ile
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Asp Trp Val Pro Asp Gln Ile Tyr
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<400> 86

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Asn

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Val Val Gln Ser Glu Gln Leu Asn
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Asp Leu Leu Gln Ile
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<400> 97

Asp Trp Val Pro Asp Gln Ile Tyr
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<210> 98
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Trp Leu Gln Gly
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<210> 99
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Lys Gly Ser Glu Phe Leu Leu Ala Asn Asp Ile Asp Asn Ser Asn Pro
1 5 10 15

Ile Val Gln Ala Glu Gln Leu Asn
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Asp Leu Leu Lys Ile
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His Leu Ser Ile Leu Glu Asp Trp Asn Gly Lys Asp
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<210> 102
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<400> 102

Tyr Ser Phe Val Arg Ala His Asp Tyr Asp Ala Gln Asp Pro Ile
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<211> 8
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<400> 103

Asp Trp Val Pro Asp Gln Ile Tyr
1 5